

PURCHASE DESCRIPTION

SIGNAL GENERATOR (50 MHz to 6 GHz)

FSNSF-C

- 1.0 GENERAL This procurement requires a stable microwave signal generator capable of generating signals over the frequency range of 50 MHz to 6 GHz with internal and external modulation capabilities.
- 2.0 CLASSIFICATION The equipment shall meet the requirements of MIL-T-28800(), Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications with the following modifications and exceptions:
- a. The relative humidity requirement is limited to 95% non-condensating.
 - b. The operating and non-operating altitude requirements are not invoked.
 - c. The Electromagnetic Interference requirements of MIL-T-28800() are limited to CE01, CE03, CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (back panel search excluded), RE02 (14 kHz to 1 GHz), and RS03.
 - d. The warm-up time is extended to one hour.
- 3.0 OPERATIONAL REQUIREMENTS The equipment shall be capable of generating signals within the parameters and accuracies specified herein.
- 3.1 Frequency Characteristics
- 3.1.1 Frequency Range: At least 50 MHz to 6 GHz
 - 3.1.2 Frequency Resolution: Minimum resolution at least 1 kHz; digital readout
 - 3.1.3 Frequency Accuracy: Equal to accuracy of reference standard (CW mode)
 - 3.1.4 Frequency Stability (equal to or better than limits specified below)
 - 3.1.4.1 Internal: Less than 1 part in 10^9 /hr at $25^\circ\text{C} \pm 5^\circ\text{C}$ after one hour warmup
 - 3.1.4.2 External: Equal to external standard frequency stability
 - 3.1.4.3 Temperature: Less than ± 2 parts in 10^5 change over 0 to 50°C temperature range

- 3.1.5 Residual Modulation (CW mode in 50 Hz to 15 kHz detection BW)
 - 3.1.5.1 FM: Less than 150 Hz rms
 - 3.1.5.2 AM: Less than 0.15% pk
- 3.1.6 Spectral Purity {F = carrier frequency}
 - 3.1.6.1 Harmonics: < -30 dBc
 - 3.1.6.2 Power Line/Fan Rotation Related Harmonics: < -30 dBc (< 1 kHz from carrier)
 - 3.1.6.3 Non-harmonics/Spurious: < -55 dBc (\geq 10 kHz from carrier)
 - 3.1.6.4 Phase Noise: < -80 dBc/Hz at 10 kHz offset from carrier
 - 3.1.6.5 RF Leakage: < -70 dBm into 50 Ω (using 2-turn, 1 inch diameter loop 1 inch from any surface, with output connector terminated in 50 Ω)
- 3.2 Output Characteristics
 - 3.2.1 Range: +10 to -120 dBm leveled (minimum)
 - 3.2.2 Accuracy: ± 2.0 dB for output levels from +10 dBm to -50 dBm; additional 0.1 dB/10 dB step for levels below -50 dBm
 - 3.2.3 Display/Resolution: Digital display; minimum resolution of 0.1 dB
 - 3.2.4 Flatness: ± 1.0 dB measured at an output level of +10 dBm
 - 3.2.5 Impedance/Connector: 50 ohms; type-N female connector
 - 3.2.5.1 VSWR: The maximum VSWR of the output connector shall be no greater than 2:1.
 - 3.2.6 Reverse Power Protection: The generator shall be capable of accepting the following signal levels at its output connector without resulting damage.
 - 3.2.6.1 Average Power: 5 watts
 - 3.2.6.2 Peak Power: 2 kW (2.3 to 6.0 GHz)
- 3.3 Modulation Characteristics
 - 3.3.1 Pulse Modulation
 - 3.3.1.1 Internal
 - 3.3.1.1.1 Rate (PRF): At least 50 Hz to 50 kHz
 - 3.3.1.1.2 Width (PW): 0.1 to 10.0 microseconds
 - 3.3.1.1.3 Rise/Fall Times: Less than 50 nanoseconds
 - 3.3.1.1.4 ON/OFF Ratio: Greater than 80 dB
 - 3.3.1.1.5 Delay: At least 50 nanoseconds to 100 milliseconds; accuracy 20% of setting

- 3.3.1.1.5.1 Sync Pulse Output: TTL compatible; rise time less than 50 nanoseconds
- 3.3.1.1.5.2 Video Pulse Output: TTL compatible; width corresponds to PW control setting
- 3.3.1.1.6 External Trigger Input: TTL compatible; at least 100 Hz to 50 kHz; provides sync rate for pulse modulation

- 3.3.1.2 External
 - 3.3.1.2.1 Rate (PRF): At least 50 Hz to 50 kHz
 - 3.3.1.2.2 Width (PW): Greater than 0.1 microseconds
 - 3.3.1.2.3 Video Output: TTL compatible pulse; same PW and PRF as external input pulse
 - 3.3.1.2.4 Pulse Input: TTL compatible

- 3.3.2 Amplitude Modulation (AM) [Level \leq 0 dBm] {F = carrier freq; Δ F = peak freq deviation}
 - 3.3.2.1 Internal AM
 - 3.3.2.1.1 Rate: At least 400 Hz and 1 kHz
 - 3.3.2.1.2 Depth: 0 to 90% minimum
 - 3.3.2.1.3 Accuracy: \pm 10% of setting [50% depth @ 1 kHz]
 - 3.3.2.1.4 Distortion: \leq 5% [50% depth @ 1 kHz rate]
 - 3.3.2.1.5 Incidental FM: \leq 200 Hz rms (0.05 - 15 kHz BW) [50% depth @ 1 kHz]
 - 3.3.2.1.6 Residual AM (AM mode): \leq 0.2% pk (0.05 - 15 kHz BW) [0.0% depth @ 1 kHz]
 - 3.3.2.2 External AM
 - 3.3.2.2.1 Rates: At least 10 Hz to 20 kHz
 - 3.3.2.2.2 Depth: 0 to 90% minimum
 - 3.3.2.2.3 Distortion: Less than 5% at 50% depth and 1 kHz rate

- 3.3.3 Frequency Modulation (FM) {F = carrier freq; Δ F = peak freq deviation}
 - 3.3.3.1 Internal FM
 - 3.3.3.1.1 Rate: At least 400 Hz and 1 kHz
 - 3.3.3.1.2 FM Deviation: \leq 400 Hz to at least 100 kHz peak [F \leq 100 MHz]
 \leq 400 Hz to at least 1 MHz peak [100 \leq F \leq 500 MHz]
 \leq 400 Hz to at least 2 MHz peak [F \geq 500 MHz]
 - 3.3.3.1.3 FM Accuracy: \pm 10% (Δ F \geq 50 kHz); \pm 20% (5 \leq Δ F < 50 kHz)
 - 3.3.3.1.4 Incidental AM: \leq 0.2% (50 Hz - 15 kHz BW) [Δ F = 20 kHz @ 1 kHz]
 - 3.3.3.1.5 Residual FM (FM mode): \leq 500 Hz rms (0.05 - 15 kHz BW) [Δ F = 0.0 kHz @ 1 kHz]
 - 3.3.3.2 External FM
 - 3.3.3.2.1 Rates: At least 20 Hz to 100 kHz
 - 3.3.3.2.2 FM Deviation: \leq 400 Hz to at least 100 kHz peak [F \leq 100 MHz]
 \leq 400 Hz to at least 1 MHz peak [100 \leq F \leq 500 MHz]
 \leq 400 Hz to at least 2 MHz peak [F \geq 500 MHz]
 - 3.3.3.2.3 FM Accuracy: \pm 10% (Δ F \geq 50 Hz); \pm 20% (5 \leq Δ F < 50 kHz)

4.0 GENERAL REQUIREMENTS

4.1 Power Source: 115 and 230 Vac $\pm 10\%$, single phase, at line frequencies of 50, 60, and 400 Hz within $\pm 10\%$, less than 250 watts

4.2 Dimensions: The total volume shall not exceed 46,000 cm³ (2,800 in³).

4.3 Weight: The overall weight shall not exceed 27.3 kg (75 lbs).

4.4 Calibration Interval: The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.5 Remote Operation: The unit will be capable of remote operation via IEEE-488() bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable, and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1, DT1.